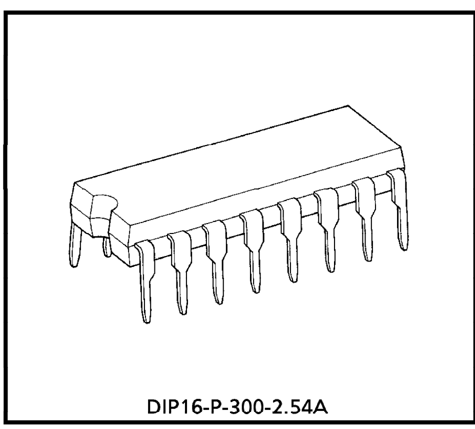
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8119P

STEREO HEADPHONE AMPLIFIER (3V USE)

The TA8119P is developed for play-back stereo headphone player (3V use), which is built-in preamplifiers, power amplifiers (for headphone) and DC volume controls.

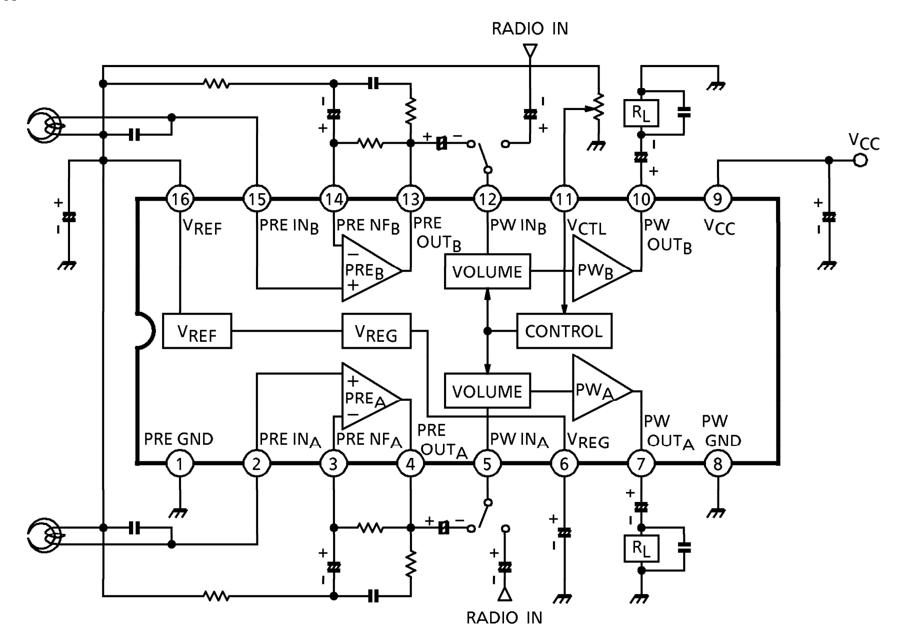

DIP16-P-300-2.54A

Weight : 1.00g (Typ.)

FEATURES

- Built-in DC volume controls
- Coupling condenser-less for input of preamplifier
- The loop gain of power amplifier is 30dB (Typ.), in case that DC volume is at maximum
- Available of external input signal from DC volume stage
- Low quiescent current (V_{CC} = 3V, Ta = 25°C)
  I_{CCQ} = 9mA (Typ.)
- Operating supply voltage range (Ta = 25°C)
  $V_{CC\,(opr)}$ = 1.8~6V

BLOCK DIAGRAM



961001EBA2

PIN FUNCTION

Terminal voltage : Typical terminal voltage at no signal with test circuit (V_{CC} = 3V, Ta = 25°C)

PIN No.	PIN NAME	CONTENTS	EQUIVALENT	TERMINAL VOLTAGE (V)
1	PRE GND	—	—	0
2	PRE IN_A	Input of preamplifier	from V_{REG}; 2 (15); 3 (14); 6.8kΩ; V_{REF}	1.3
15	PRE IN_B			
3	PRE NF_A	NF of preamplifier		1.3
14	PRE NF_B			
4	PRE OUT_A	Output of preamplifier	from V_{REG}; 4 (13)	1.3
13	PRE OUT_B			
5	PW IN_A	Input of power amplifier for headphone (through DC volume stage)	V_{CC}; 10kΩ; 5 (12); V_{REF}	1.3
12	PW IN_B			
6	V_{REG}	Ripple filter of power supply	V_{CC}; 4kΩ; 26kΩ; 6; 4kΩ; 13kΩ; 13kΩ; 16	2.6
16	V_{REF}	Reference voltage		1.3
7	PW OUT_A	Output of power amplifier	V_{CC}; to DC volume control stage; 7 (10)	1.3
10	PW OUT_B			
8	PW GND	—	—	0
9	V_{CC}	—	—	3
11	V_{CTL}	Input of control voltage for volume control	V_{CC}; 11	—

961001EBA2'

APPLICATION NOTE

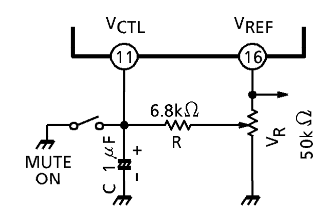
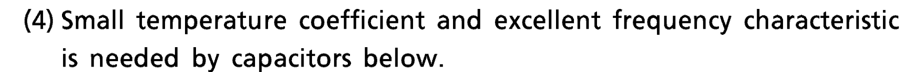


Fig.1 Function of mute

(1) A volume which has the characteristic "curve A" is available for the DC volume control.

(2) The capacitor C is used for absorbing volume sliding noise.

(3) The DC volume control circuit is applicable to "Function of Mute", connecting as Fig.1.
In case of tuning mute-on, the load of "Reference voltage circuit" is R, at maximum volume.



(4) Small temperature coefficient and excellent frequency characteristic is needed by capacitors below.

- Oscillation preventing capacitors for power amplifier output.
- Capacitor between V_{REF} and GND.
- Capacitor between V_{CC} and GND.
- Capacitor between V_{REG} and GND.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	7	V
Output Current	$I_{O\,(peak)}$	120	mA
Power Dissipation	P_D (Note)	750	mW
Operating Temperature	T_{opr}	−25~75	°C
Storage Temperature	T_{stg}	−55~150	°C

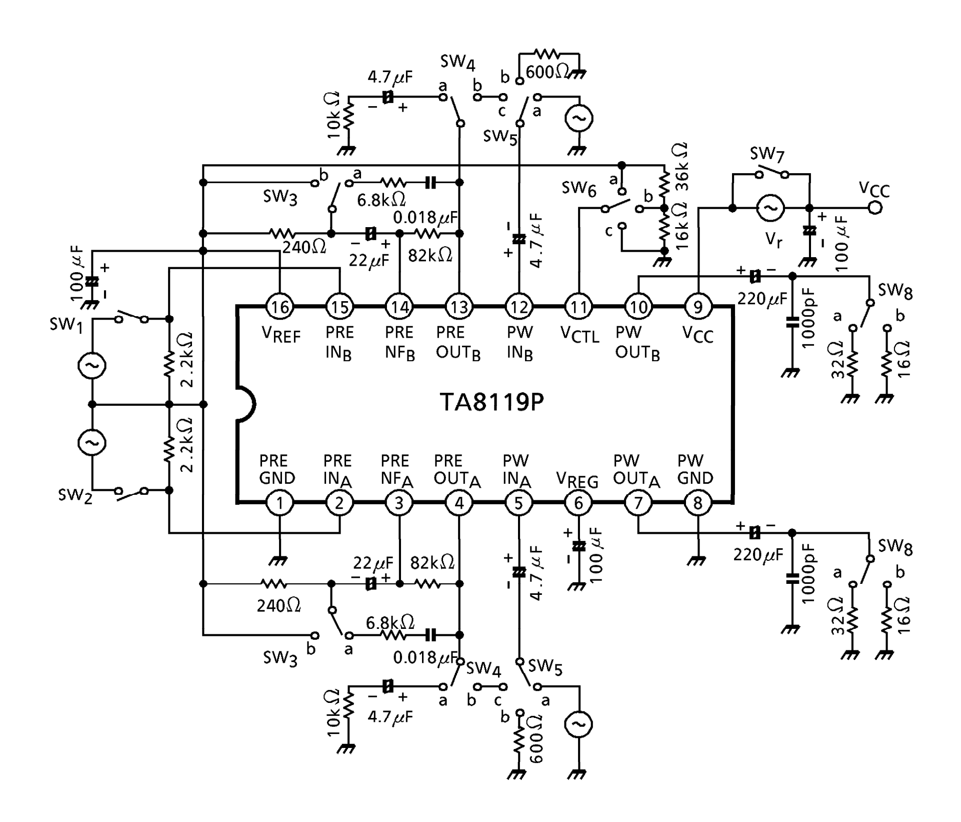
(Note) Derated above Ta = 25°C in the proportion of 6mW / °C.

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, V_{CC} = 3V, Ta = 25°C, f = 1kHz
Preamplifier : R_L = 10kΩ, Vol = MIN
Power amplifier : R_L = 32Ω, Vol = MAX

CHARACTERISTIC			SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Supply Current			I_{CCQ1}	—	V_{in} = 0, Vol = MIN	—	9.0	13.0	mA
			I_{CCQ2}	—	V_{in} = 0, Vol = MAX	—	11.0	—	
Preamplifier Section	Open Loop Voltage Gain		G_{VO}	—	V_o = − 12dBV	55	62	—	dB
	Closed Loop Voltage Gain		G_{VC}	—	NAB = 1kHz, V_o = − 12dBV	—	33	—	dB
	Maximum Output Voltage		V_{om}	—	THD = 1%	600	720	—	mV_{rms}
	Total Harmonic Distortion		THD1	—	V_o = − 12dBV	—	0.04	0.1	%
	Equivalent Input Noise Voltage		V_{ni}	—	R_g = 2.2kΩ BPF = 30Hz~20kHz NAB (G_V = 33dB, f = 1kHz)	—	1.2	2.0	μV_{rms}
	Ripple Rejection Ratio		RR1	—	R_g = 2.2kΩ V_r = − 22dBV, f_r = 100Hz	—	46	—	dB
Power Amplifier Section	Output Power	(1)	P_{o1}	—	THD = 10%	20	27	—	mW
		(2)	P_{o2}	—	R_L = 16Ω, THD = 10%	—	39	—	
	Voltage Gain (1)		G_{V1}	—	V_o = − 12dBV	28	30	32	dB
	Channel Balance		CB			—	0	1.5	dB
	Voltage Gain (2)		G_{V2}	—	V_o = − 12dBV, Vol = MID	—	15	—	dB
	Total Harmonic Distortion		THD2	—	P_o = 10mW	—	0.5	1.2	%
			THD3		P_o = 10mW, Vol = MID	—	0.3	—	
	Output Noise Voltage		V_{no}	—	R_g = 600Ω BPF = 30Hz~20kHz	—	250	320	μV_{rms}
	Maximum Attenuation		ATT	—	V_o = − 12dBV Vol = MAX→MIN	66	72	—	dB
	Ripple Rejection Ratio		RR2	—	R_g = 600Ω V_r = − 22dBV, f_r = 100Hz	—	46	—	dB
Total	Cross Talk (CH-A / CH-B)		CT	—	R_g = 2.2kΩ V_o = − 12dBV, Vol = MAX	34	40	—	dB

TEST CIRCUIT



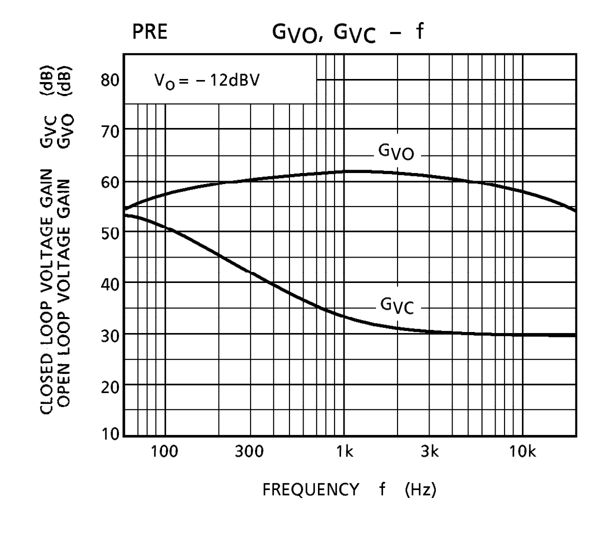
SWITCH STATE FOR ELECTRICAL CHARACTERISTICS

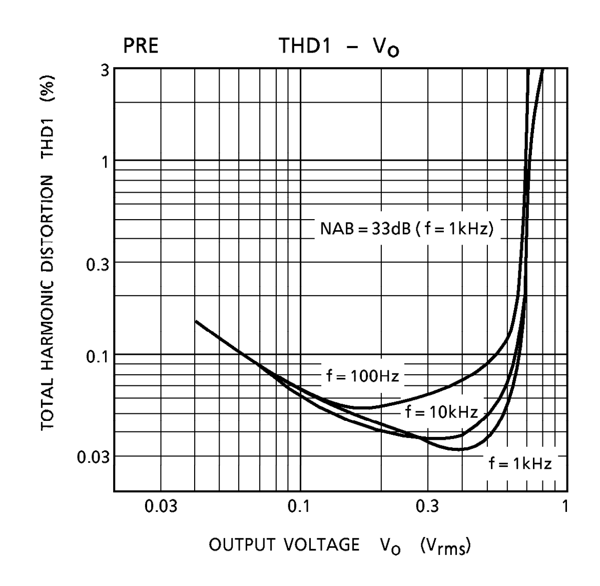
CHARACTERISTIC	SW_1	SW_2	SW_3	SW_4	SW_5	SW_6	SW_7	SW_8
I_{CCQ1}	×	×	a	a	b	c	○	a
I_{CCQ2}	×	×	a	a	b	a	○	a
G_{VO}	○	○	b	a	b	c	○	a
G_{VC}	○	○	a	a	b	c	○	a
V_{om}	○	○	a	a	b	c	○	a
THD1	○	○	a	a	b	c	○	a
V_{ni}	×	×	a	a	b	c	○	a
RR1	×	×	a	a	b	c	×	a
P_{o1}	×	×	a	a	a	a	○	a
P_{o2}	×	×	a	a	a	a	○	b
G_{V1}	×	×	a	a	a	a	○	a
CB	×	×	a	a	a	a	○	a
G_{V2}	×	×	a	a	a	b	○	a
THD2	×	×	a	a	a	a	○	a
THD3	×	×	a	a	a	b	○	a
V_{no}	×	×	a	a	b	a	○	a
ATT	×	×	a	a	a	a→c	○	a
RR2	×	×	a	a	b	c	×	a
CT	○ / ×	× / ○	a	b	c	a	○	a

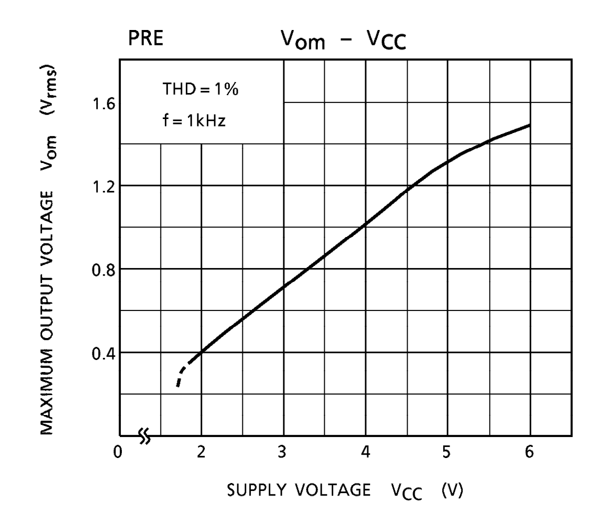
○ : short × : open

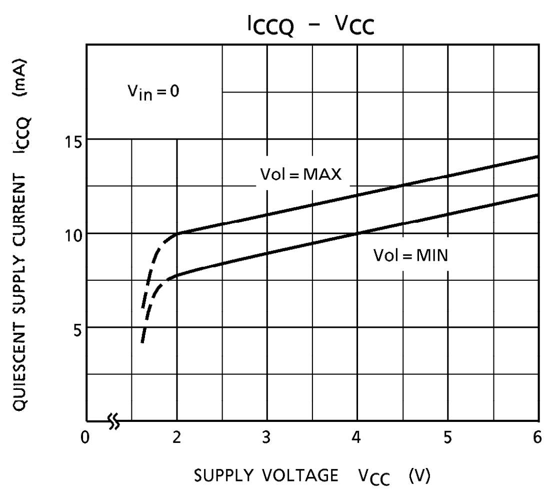
CHARACTERISTIC CURVES

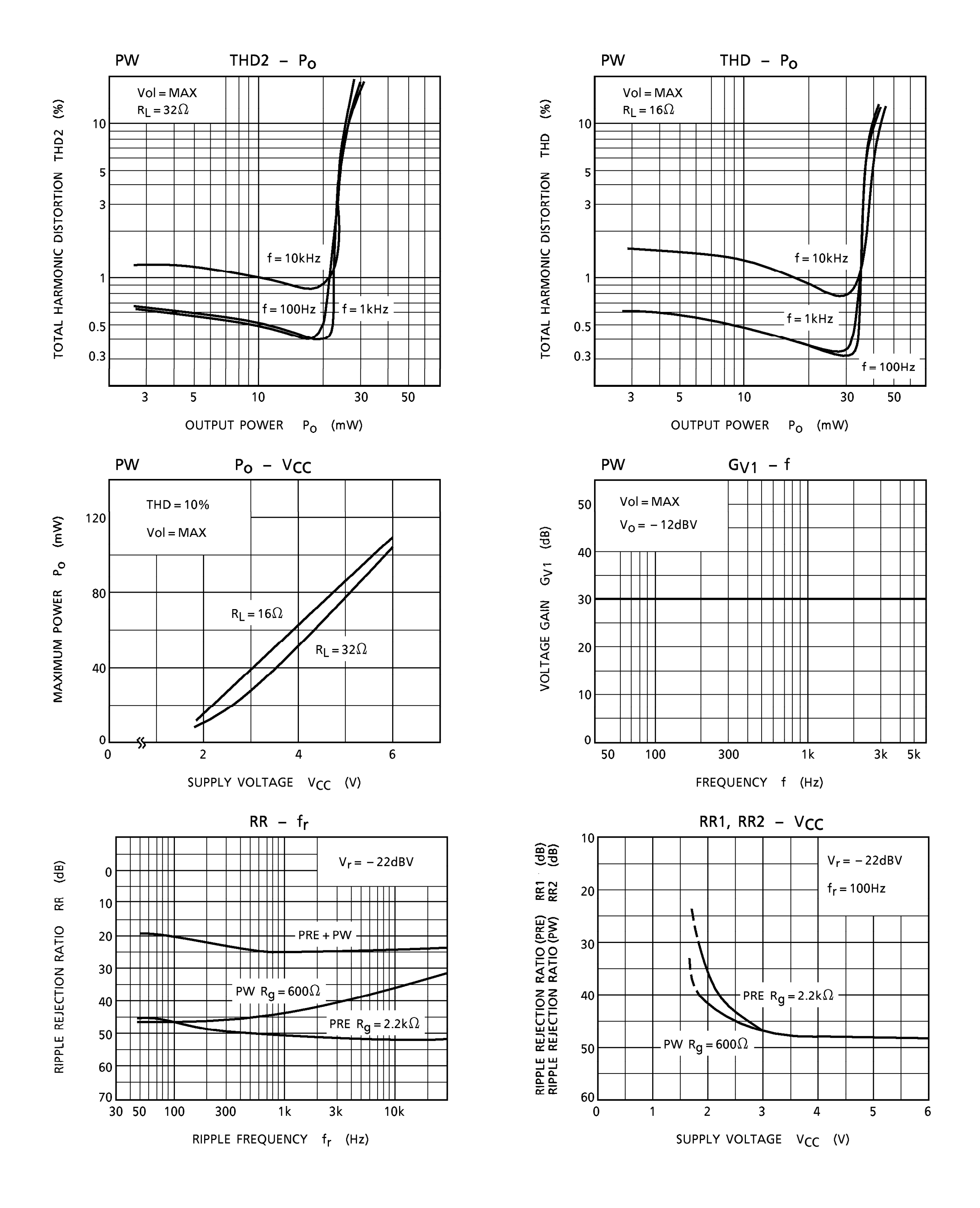
Unless otherwise specified : V_{CC} = 3V, f = 1kHz, Ta = 25°C
Preamplifier : R_L = 10kΩ, Vol = MIN
Power Amplifier : R_L = 32Ω, Vol = MAX

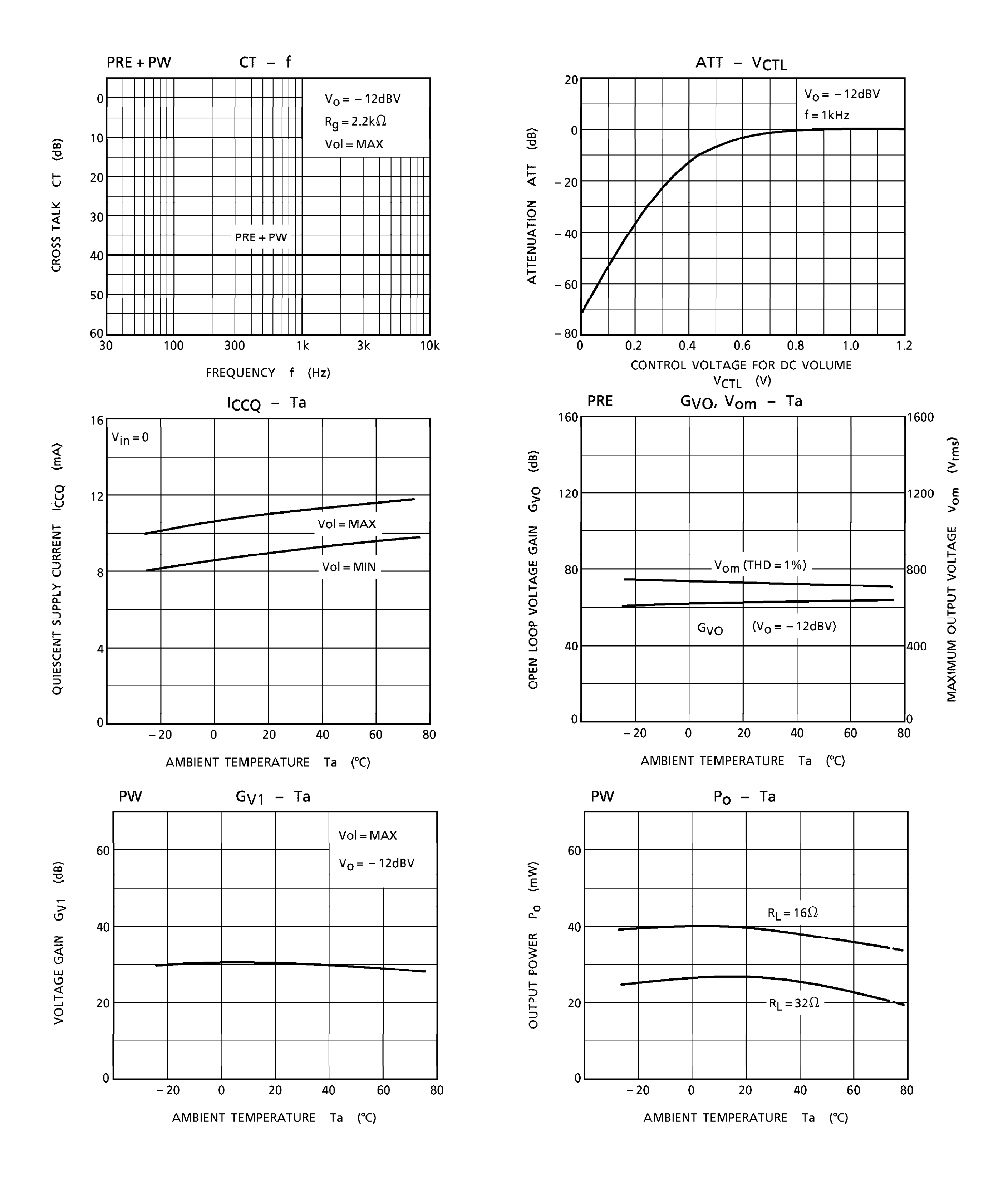






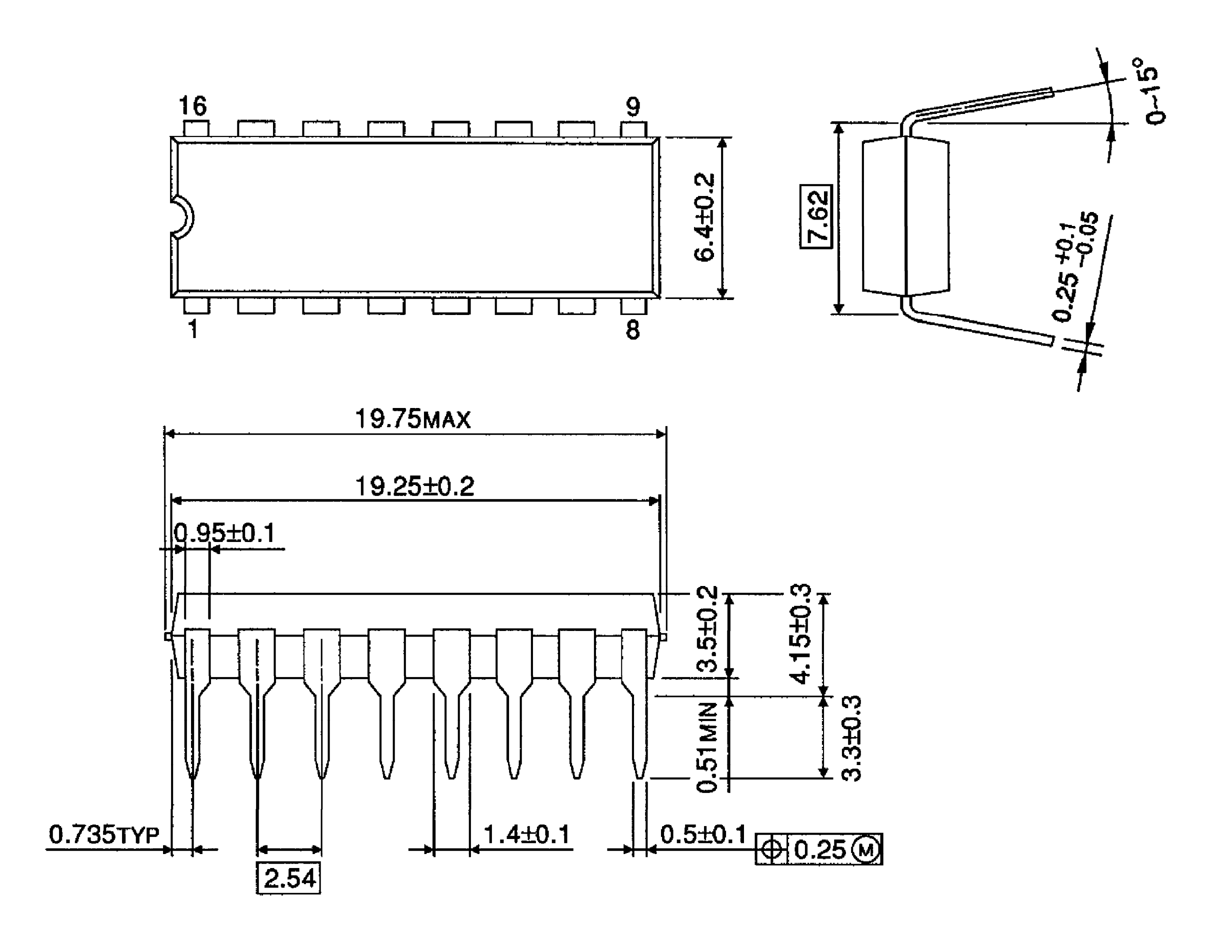



PW THD2 – P_o
Vol = MAX
R_L = 32Ω
f = 10kHz
f = 100Hz
f = 1kHz
TOTAL HARMONIC DISTORTION THD2 (%)
OUTPUT POWER P_o (mW)
PW THD – P_o
Vol = MAX
R_L = 16Ω
f = 10kHz
f = 1kHz
f = 100Hz
TOTAL HARMONIC DISTORTION THD (%)
OUTPUT POWER P_o (mW)
PW P_o – V_{CC}
THD = 10%
Vol = MAX
R_L = 16Ω
R_L = 32Ω
MAXIMUM POWER P_o (mW)
SUPPLY VOLTAGE V_{CC} (V)
PW G_{V1} – f
Vol = MAX
V_o = –12dBV
VOLTAGE GAIN G_{V1} (dB)
FREQUENCY f (Hz)
RR – f_r
V_r = –22dBV
PRE + PW
PW R_g = 600Ω
PRE R_g = 2.2kΩ
RIPPLE REJECTION RATIO RR (dB)
RIPPLE FREQUENCY f_r (Hz)
RR1, RR2 – V_{CC}
V_r = –22dBV
f_r = 100Hz
PRE R_g = 2.2kΩ
PW R_g = 600Ω
RIPPLE REJECTION RATIO (PRE) RR1 (dB)
RIPPLE REJECTION RATIO (PW) RR2 (dB)
SUPPLY VOLTAGE V_{CC} (V)


PRE + PW CT – f
VO = – 12dBV
Rg = 2.2kΩ
Vol = MAX
PRE + PW
CROSS TALK CT (dB)
FREQUENCY f (Hz)
ATT – VCTL
VO = – 12dBV
f = 1kHz
ATTENUATION ATT (dB)
CONTROL VOLTAGE FOR DC VOLUME VCTL (V)
ICCQ – Ta
Vin = 0
Vol = MAX
Vol = MIN
QUIESCENT SUPPLY CURRENT ICCQ (mA)
AMBIENT TEMPERATURE Ta (°C)
PRE GVO, Vom – Ta
Vom (THD = 1%)
GVO (VO = – 12dBV)
OPEN LOOP VOLTAGE GAIN GVO (dB)
MAXIMUM OUTPUT VOLTAGE Vom (Vrms)
AMBIENT TEMPERATURE Ta (°C)
PW GV1 – Ta
Vol = MAX
VO = – 12dBV
VOLTAGE GAIN GV1 (dB)
AMBIENT TEMPERATURE Ta (°C)
PW PO – Ta
RL = 16Ω
RL = 32Ω
OUTPUT POWER PO (mW)
AMBIENT TEMPERATURE Ta (°C)

OUTLINE DRAWING

DIP16-P-300-2.54A Unit : mm



Weight : 1.00g (Typ.)